



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/772,023	02/04/2004	Paul Marie Ayoub	TH2229 (US)	5337
23632	7590	06/15/2006	EXAMINER	
SHELL OIL COMPANY			DOUGLAS, JOHN CHRISTOPHER	
P O BOX 2463			ART UNIT	PAPER NUMBER
HOUSTON, TX 772522463			1764	

DATE MAILED: 06/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/772,023

Applicant(s)

AYOUB ET AL.

Examiner

John C. Douglas

Art Unit

1764

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 February 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-281 is/are pending in the application.
- 4a) Of the above claim(s) 44-281 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-43 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 1-281 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>5/13/04 + 9/16/04</u> . | 6) <input type="checkbox"/> Other: _____ |

Election/Restrictions

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-43, drawn to a serial process including steps of isomerization, alkylation, and dehydrogenation, classified in class 585, subclass 323.
- II. Claims 44-95, drawn to a serial process including steps of dehydrogenation, isomerization, and alkylation, classified in class 585, subclass 323.
- III. Claims 96-132, drawn to a serial process including steps of dimerization and alkylation, classified in class 585, subclass 323.
- IV. Claims 133-161, drawn to a serial process including steps of dimerization, alkylation, isomerization, and alkylation, classified in class 585, subclass 323.
- V. Claims 162-194, drawn to a serial process including steps of hydrogenation, dehydrogenation, isomerization, and alkylation, classified in class 585, subclass 323.
- VI. Claims 195-231, drawn to a serial process including steps of hydrogenation, dehydrogenation, dimerization, and alkylation, classified in class 585, subclass 323.
- VII. Claims 232-281, drawn to a serial process including steps of hydrogenation dehydrogenation-isomerization, and alkylation, classified in class 585, subclass 323.

Art Unit: 1764

3. Because these inventions are independent or distinct for the reasons given above and have acquired a separate status in the art because of their recognized divergent subject matter, restriction for examination purposes as indicated is proper.

4. During a telephone conversation with Donald Haas on 5/17/2006 a provisional election was made with traverse to prosecute the invention of Group I, claims 1-43.

Affirmation of this election must be made by applicant in replying to this Office action.

Claims 44-281 are withdrawn from further consideration by the examiner, 37

CFR 1.142(b), as being drawn to a non-elected invention.

5. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Specification

6. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Art Unit: 1764

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claims 1- rejected under 35 U.S.C. 103(a) as being unpatentable over Marinangeli (US 6187981), hereinafter "Marinangeli 1", in view of Marinangeli (US 6111158), hereinafter "Marinangeli 2".

Art Unit: 1764

11. With respect to claim 1, Marinangeli 1 discloses feeding paraffins into an isomerization unit; sending a portion of the isomerization product containing lightly branched paraffins to a dehydrogenation zone; sending a portion of the dehydrogenation product containing paraffins, linear olefins, branched olefins, and aromatics; sending the stream to an alkylation zone; and recycling the unreacted paraffins to the dehydrogenation zone (see Marinangeli 1, column 29, line 34 – column 31, line 31 and column 25, lines 23-38).

Marinangeli 1 does not disclose feeding olefins in the isomerization unit to produce branched olefins from linear olefins, feeding the isomerization product to the alkylation zone to produce alkyl aromatic hydrocarbons comprising a branched alkyl group, separating the alkyl aromatics from the alkylation product stream and separating paraffins and unreacted olefins from the alkylation product stream, feeding the paraffins and unreacted olefins to a dehydrogenation unit to produce olefins and introducing the olefins into the isomerization unit.

However, Marinangeli 2 discloses feeding linear olefins to an isomerization step to produce branched olefins (see Marinangeli 2, column 9, lines 29-31 and 64-66) and feeding the isomerization product to an alkylation zone to produce phenyl-alkanes for detergent range alkylbenzenes including linear, branched, and modified alkylbenzenes and producing unreacted benzenes (see Marinangeli 2, column 5, lines 49-56 and column 10, lines 30-35 and 47-50).

Marinangeli 2 discloses that the isomerization step converts linear olefins to branched olefins and that branched olefins react with aryl compounds to form alkyl compounds (see Marinangeli 2, column 10, lines 19-25).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of Marinangeli 1 to include feeding linear olefins to an isomerization step to produce branched olefins and feeding the isomerization product to an alkylation zone to produce phenyl-alkanes for detergent range alkylbenzenes including linear, branched, and modified alkylbenzenes and producing unreacted benzenes in order to convert olefins to alkyl compounds.

Also, it would have been obvious to separate the unreacted aromatics and the unreacted paraffins and olefins from the alkyl aromatic product in order to obtain a pure product.

In addition, according to *In re Burhans*, 154 F.2d 690, the selection of any order of process steps is prima facie obvious in the absence of new or unexpected results (see MPEP 2144.04 IV. C.).

Therefore, it would have been obvious to place the dehydrogenation step after the alkylation step instead of between the isomerization step and the alkylation step.

12. With respect to claims 2 and 3, Marinangeli 2 discloses where the olefinic feedstock can come from and olefin oligomerization process or a Fischer-Tropsch process (see Marinangeli 2, column 8, lines 22-36).

Art Unit: 1764

13. With respect to claims 4 and 5, Marinangeli 2 discloses where the olefins and paraffins have a number of carbon atoms between 10 and 14 (see Marinangeli 2, column 7, lines 19-25 and 50-54).
14. With respect to claims 6 and 7, Marinangeli 1 discloses where the isomerization unit is operated at a temperature between about 122 to about 752 degrees C and a pressure of about 1 atm to about 2000psig (see Marinangeli 1, column 10, lines 27-35).
15. With respect to claims 8 and 10-13, Marinangeli 1 discloses where about 25 % of the olefins are unbranched, branched olefins with two branches comprise less than 30% of the branched olefins, and olefins with one branch comprise more than 70 % of the branched olefins ($.70 \cdot .75 + 2 \cdot .30 \cdot .75 = 1$ branch per olefin) (see Marinangeli 1, column 17, lines 44-51 and column 18, line 64 – column 19, line 13).
16. With respect to claim 9, Marinangeli 1 discloses where the lightly branched olefins can have branches selected from methyl and ethyl groups (see Marinangeli 1, column 18, lines 49-52).
17. With respect to claims 14-16, Marinangeli 2 discloses where the branched olefins are monomethyl branched olefins (see Marinangeli 2, column 10, lines 6-8).
18. With respect to claims 17 and 18, Marinangeli 2 discloses where the olefins comprising at least one quaternary carbon atom comprise less than 1% of the olefinic feedstock (see Marinangeli 2, column 8, lines 18-21).
19. With respect to claims 19 and 20, Marinangeli 1 discloses that discloses that only one methyl group branch is preferred (see Marinangeli 1, column 22, lines 12-14).

Art Unit: 1764

Therefore, it would have been obvious to have the alkylation unit configured to produce greater than 85% monoalkylated aromatics because such products are preferred.

20. With respect to claims 21 and 23, Marinangeli 2 discloses where the ratio of aryl compounds to monoolefins is between about 1:1 to about 35:1 and that the aryl compound is benzene (see Marinangeli 2, column 10, lines 19-46).

21. With respect to claim 22, Marinangeli 2 discloses where the alkylation temperature is between about 80 and about 200 degrees C (see Marinangeli 2, column 10, lines 50-53).

22. With respect to claim 24, Marinangeli 2 discloses where the alkylation unit produces monoalkylbenzenes (see Marinangeli 2, column 10, lines 30-35).

23. With respect to claim 25, Marinangeli 1 discloses where the alkylation has an internal quaternary phenyl-alkane selectivity of less than 5, where the lightly branched olefins can have branches selected from methyl and ethyl groups, and where about 25 % of the olefins are unbranched, branched olefins with two branches comprise less than 30% of the branched olefins, and olefins with one branch comprise more than 70 % of the branched olefins ($.70 \cdot .75 + 2 \cdot .30 \cdot .75 = 1$ branch per olefin) (see Marinangeli 1, column 17, lines 44-51, column 18, lines 49-52 and 64 – column 19, line 13, and column 22, lines 24-31).

24. With respect to claims 38 and 39, Marinangeli 1 discloses where the dehydrogenation unit is operated at temperatures from about 400 to about 900 degrees C and pressures from about 1 kPa to about 1013 kPa (0-10 atm) (see Marinangeli 1, column 17, lines 6-10).

Art Unit: 1764

25. With respect to claim 40, Marinangeli 2 discloses where the dehydrogenation product stream contains mostly unreacted paraffins and 20% olefins (see Marinangeli 2, column 9, lines 18-28).

26. With respect to claim 41, Marinangeli 2 discloses passing the dehydrogenation effluent to an isomerization zone (see Marinangeli 2, column 9, lines 11-14 and MPEP 2144.04).

27. With respect to claim 42, it would have been obvious to one having ordinary skill in the art to recycle the unreacted paraffins back to the dehydrogenation unit in order to obtain more product out of a given amount of feed.

28. With respect to claim 43, Marinangeli 1 discloses where the alkylbenzenes are subject to sulfonation to prepare alkylbenzene sulfonates and polyalkylbenzenes (see Marinangeli 1, column 23, lines 8-14).

29. Claims 26-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marinangeli 1 in view of Marinangeli 2 as applied to claim 1 above, and further in view of Funk (US 5523503). Marinangeli 1 in view of Marinangeli 2 discloses everything in claim 1 and Marinangeli 2 discloses that branched olefins are fed to the process (see Marinangeli 2, column 8, lines 22-25), but do not disclose adding paraffins or olefins to adjust the ratio of paraffins to olefins.

However, Funk discloses adding either olefins, such as the linear olefin butene or paraffins at a number of points along the flow path of the feed to aid in controlling the paraffin to olefin ratio (see Funk, column 6, lines 51-53, column 7, lines 20-22, column 11, lines 42-45 and claim 13).

Funk discloses that it is preferred to maintain high paraffin to olefin ratios (see Funk, column 11, lines 50-54).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of Marinangeli 1 in view of Marinangeli 2 to include adding either olefins or paraffins at a number of points along the flow path of the feed to aid in controlling the paraffin to olefin ratio in order to maintain the preferred paraffin to olefin ratios.

In addition, in the case of *In re Burhans*, 154 F.2d 690 (CCPA 1946), the court held that the selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results. Therefore, the changing of the location of adding olefins or paraffins either before or during isomerization or alkylation or both, would be changing the sequence of performing process steps and thus would be obvious.

Conclusion

30. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: Anantaneni (US 6133492) and Marinangeli (US 6670516).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John C. Douglas whose telephone number is 571-272-1087. The examiner can normally be reached on 7:30 A.M. to 4:30 P.M..

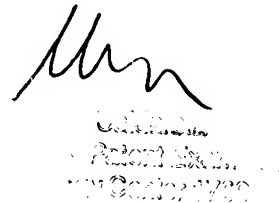
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on 571-272-1444. The fax phone

Art Unit: 1764

number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JCD



A handwritten signature in black ink is positioned above a circular official stamp. The stamp contains text that is partially illegible but appears to include "Patent Office" and "United States Patent and Trademark Office".